

What is claimed is:

1. A method of manufacture of gypsum board having inorganic fiber face sheets, comprising the steps of:

providing a first gypsum slurry having a first consistency;

applying a predetermined amount of said first gypsum slurry onto at least a first continuous sheet, said sheet including randomly aligned, inorganic fibers having random interstices between said fibers;

passing said first continuous inorganic fiber sheet through a gypsum application station, said station including two applicator wheels for passing the inorganic fiber sheet therethrough, so as to cause the first gypsum slurry having a first consistency to penetrate through said random interstices between the inorganic fibers and to thereby coat both top and bottom surfaces of said first inorganic fiber sheet with said gypsum slurry having a first consistency;

depositing a second gypsum slurry having a second consistency on said first inorganic fiber sheet and causing said second gypsum slurry to be essentially evenly distributed over an upwardly facing top surface of said first inorganic fiber sheet;

applying a third gypsum slurry having a third consistency to a second of said at least one continuous, inorganic, fiber sheets, said second inorganic fiber sheet having random interstices between the fibers and causing said third gypsum slurry to penetrate essentially completely through said random interstices and to thereby coat both top and bottom surfaces of said second inorganic fiber sheet with said third gypsum slurry;

applying said second inorganic fiber sheet onto the second gypsum slurry thereby sheathing said second gypsum slurry within said first and second inorganic fiber sheets to form a wet gypsum board; and

forming said gypsum board product by passing said wet gypsum board through a board forming station having a lower forming plate and an upper forming plate, said upper forming plate having at least a portion thereof being set at a predetermined angle to said lower forming plate, the separation between said lower forming plate and said portion of said upper forming plate defining a predetermined dimension substantially equal to the desired thickness of the manufactured gypsum board product.

2. The method of manufacture of gypsum board according to Claim 1 wherein said step of providing said first gypsum slurry further comprises providing said first gypsum slurry having a slurry consistency which is substantially denser relative to said second gypsum slurry consistency.

3. The method of manufacture of gypsum board according to Claim 1 wherein said step of applying said third gypsum slurry further comprises applying a third gypsum slurry having a third gypsum slurry consistency which is substantially identical to said first gypsum slurry consistency.

4. The method of manufacture of gypsum board according to Claim 1 wherein said steps of applying said first and third gypsum slurries to said lower and upper inorganic fiber sheets further comprise obtaining a supply of said gypsum slurry from an identical gypsum slurry supply.

5. The method of manufacture of gypsum board according to Claim 1, wherein said inorganic fiber of said lower and upper sheets further comprises a glass fiber.

6. The method of manufacture of gypsum board according to Claim 1 further comprising an additive step prior to the step depositing said first gypsum slurry, said step comprising introducing a polymeric compound additive to said first gypsum slurry prior to depositing said first gypsum slurry on said lower inorganic fiber sheet to produce a gypsum polymer layer.

7. The method of manufacture of gypsum board according to Claim 5 further comprising a step following the board forming station of applying an acrylic coating onto at least one of said lower and upper surfaces of said gypsum board and thereby causing said acrylic coating to bond with said polymeric additive in said first and third gypsum slurries.

8. The method of manufacture of gypsum board according to Claim 1 further comprising a step for folding the lateral edges of said first continuous inorganic fiber sheet over said second gypsum slurry prior to said step applying said second inorganic fiber sheet onto the second gypsum slurry.

9. The method of manufacture of gypsum board according to Claim 1 wherein said step of passing said first continuous inorganic fiber sheet through a gypsum application station further comprises rotating said two applicator wheels in the forward direction relative to the motion of said inorganic fiber sheet through said gypsum application station.

10. The method of manufacture of gypsum board according to Claim 1 wherein said step of passing said first continuous inorganic fiber sheet through a gypsum application station further comprises rotating said two applicator wheels in the reverse direction relative to the motion of said first inorganic fiber sheet through said gypsum application station.

11. The method of manufacture of gypsum board according to Claim 1 wherein said step of depositing said second gypsum slurry on said first continuous inorganic fiber sheet is followed by dispersing said unset second gypsum slurry over said first continuous inorganic fiber sheet so as to uniformly cover said unset second gypsum slurry over said upwardly facing said first inorganic fiber sheet.

12. The method of manufacture of gypsum board according to Claim 1 wherein said step of passing said first continuous inorganic fiber sheet through a gypsum application station further comprises passing said first continuous inorganic fiber sheet through two applicator

wheels, at least one of said applicator wheels including a thin film polymer coating on the surface thereof.

13. The method of manufacture of gypsum board according to Claim 1 wherein said step of passing said first continuous inorganic fiber sheet through a gypsum application station further comprises passing said first continuous inorganic fiber sheet through two applicator wheels, at least one of said applicator wheels including a thin film polymer coating on the surface thereof, said thin film polymer coating further comprising Teflon®.

14. The method of manufacture of gypsum board according to Claim 1 further comprising passing the wet gypsum board through an edger bar assembly, after the board forming step, so as to form the lateral edges of said gypsum board product and to complete the smoothing of the upper surface of said gypsum board product.

15. The method of manufacture of gypsum board according to Claim 6 further comprising, after the board forming step, an acrylic application step including applying an acrylic coating over the gypsum slurry containing said polymer layer on said gypsum board surface before said polymer is cured.

16. The method of manufacture of gypsum board according to Claim 15 wherein said acrylic coating is applied by flood coating.

17. The method of manufacture of gypsum board according to Claim 6 wherein said additive step includes adding to said unset gypsum at least one polymeric compound selected from a group consisting of polyacrylamide, polymethylacrylamide, polyvinylidene chloride (PVDC), Nylon®, polyvinylchloride (PVC), polyethylene, cellulose acetate, Bunyl® Rubber, polycarbonate, polypropylene, polystyrene, styrene, butadiene, styrene butadiene copolymer, Neoprene®, Teflon®, natural rubber, poly (2,6 dimethyl pentene oxide), poly 4, methyl pentene-1 and polydimethyl siloxane.

18. A multilayer gypsum board comprising a first layer of a mixture of set gypsum having an outer surface and at least one polymeric compound entrained within said set gypsum, and being impregnated in a thin sheet of randomly aligned inorganic fibers, said outer surface of said sheet being essentially encased within said combination set gypsum and polymeric compound combination;

a second layer comprised of set gypsum, said set gypsum in said second layer being of a lower density than the set gypsum in said first layer; and a third layer having an outer surface comprising set gypsum impregnated with a second thin sheet of randomly aligned inorganic fibers, said outer surface of said third sheet being essentially encased within said set gypsum of said third layer; the set gypsum in said first being integrally bonded to the gypsum of said second layer and the set gypsum in said second layer being bonded integrally to the gypsum in said third layer.

19. The multilayer gypsum board according to Claim 18 wherein said thin inorganic fiber sheets comprise glass fibers.

20. The multilayer gypsum board according to Claim 18 wherein said glass fibers comprise elongated fibers having an average fiber diameter of from about 13-16 μ m.

21. The multilayer gypsum board according to Claim 18 wherein said at least one polymeric compound entrained within said set gypsum being is selected from a group consisting of polyacrylamide, polymethylacrylamide, polyvinylidene chloride (PVDC), Nylon[®], polyvinylchloride (PVC), polyethylene, cellulose acetate, Bunyl[®] Rubber, polycarbonate, polypropylene, polystyrene, styrene, butadiene, styrene butadiene copolymer, Neoprene[®], Teflon[®], natural rubber, poly (2,6 dimethyl pentene oxide), poly 4, methyl pentene-1 and polydimethyl siloxane.

22. The multilayer gypsum board according to Claim 18 wherein said thin inorganic fiber sheets comprise glass fibers.

23. In a gypsum board forming device comprising a supply of continuous sheet of inorganic fiber having random interstices between the fibers comprising said sheet, a gypsum slurry mixer including a gypsum delivery mechanism, at least one gypsum penetration station for penetrating said gypsum slurry into said random interstices between the inorganic fibers, a gypsum core delivery mechanism, a sheet joining mechanism for joining said continuous sheet of inorganic fiber to said core gypsum, and a gypsum conveyor line, having a belt with a surface, for conveying formed gypsum board from the sheet joining mechanism, an edger bar assembly comprising:

- a) two laterally disposed edger shoes having a bottom surface adapted to ride on the belt surface;
- b) laterally disposed edger bar clamping elements attached to said edger shoes;
- c) a longitudinal edger bar, having two ends, extending over said belt surface and between said edger bar clamping elements so that each end of said edger bar is disposed within one of said laterally disposed edger bar clamping elements;
and
- d) each edger shoe having a flapper edge mechanism attached thereto, said flapper edge mechanism having an inboard surface abutting the edge of the gypsum board for retaining unset slurry skimmed off the surface of the wet gypsum board by said edger bar from overflowing onto the belt.

24. In a gypsum board forming device according to Claim 23, said edger bar further comprising a rounded leading bottom edge for skimming over the surface of the wet gypsum board.

25. In a gypsum board forming device according to Claim 23 further comprising an acrylic coating application station for applying acrylic on at least one of said gypsum board surfaces by flood coating.

26. In a gypsum board forming device comprising a supply of continuous sheet of inorganic fiber having random interstices between the fibers comprising said sheet, a gypsum slurry mixer including a gypsum delivery mechanism, at least one gypsum penetration station for penetrating said gypsum slurry into said random interstices between the inorganic fibers, a gypsum core delivery mechanism, a sheet joining mechanism for joining said continuous sheet of inorganic fiber to said core gypsum, and a gypsum conveyor line, having a belt with a surface, for conveying formed gypsum board from the sheet joining mechanism, an edger bar assembly comprising:

- a) at least two edger bar mounting bases, one each mounted at a lateral edge of said edger bar assembly;
- b) two laterally disposed arms, one each attached to each edger bar mounting base;
- c) a longitudinal edger bar, having two ends, extending between said at least two edger bar mounting bases;
- d) laterally disposed edger bar clamping elements attached to said edger bar;
- e) each mounting base having a flapper edge mechanism attached thereto, said flapper edge mechanism having an inboard surface abutting the edge of the gypsum board for retaining unset slurry skimmed off the surface of the wet gypsum board by said edger bar from overflowing onto the belt.

27. In a gypsum board forming device according to Claim 26, said edger bar further comprising a bottom edge for skimming over the surface of the wet gypsum board and a pre-forming plate disposed at the leading edge of the edger bar, said pre-forming plate having an angle relative to the surface of said bottom edge.

28. In a gypsum board forming device according to Claim 27, wherein said angle is in a range of from about 30 ° and 60 ° .

29. In a gypsum board forming device according to Claim 27, wherein said angle is about 45°.

30. In a gypsum board forming device according to Claim 26 wherein said flapper edge mechanism further comprising at least one flapper disposed at the lateral edges of the edger bar assembly, said flappers comprising a smooth surface and having a slippery or non-stick material.

31. In a gypsum board forming device according to Claim 30 wherein said slippery or non-stick material further comprises Teflon®.

Patent to be granted